The Nature of Light

Michael Alan Speedie

Abstract

The basis of this paper is the hypothesis that the current understanding of photons is flawed. It is proposed that photons are continuously present in space even when they are not emitting light. Light is created when these photons interact with each other in a similar manner as conventional particles of matter that interact to create sound. Photons can be at rest, not creating light. However, when photons are agitated, they create waves in a photon atmosphere that are detected by light-sensitive receptors. The process of photon waves being detected as light is similar to the process of conventional particle waves being detected as sound by an audio receptor. This new understanding of light resolves inconsistencies in the current particle theory of light such as single particle interference.

Light consists of particles and waves. This statement has been accepted as fact while causing universal consternation amongst physicists. But these two properties of light should not be considered a dichotomy. A misunderstanding in the way photons move is the reason for this sense of incongruity.

It is proposed that light is vibration of a photon field- or photon atmosphere. Analogous to sound particles making up a gas, liquid, or solid, individual photons are present everywhere in space that light, or electromagnetic waves, can be transmitted.

When light is considered in this way, it changes the understanding of what photons are, and how they behave as a group; and it also redefines the concept of luminance.

Light isn't a quantitative amount of photons contacting a detector such as an eye, or other type of photosensitive receptor, but instead it is movement of the photons that excite or agitate a light receptor.

Augustin-Jean Fresnel hypothesized in 1815 that space is filled with a medium known as 'ether' which is necessary as a medium to transmit light waves. This paper hypothesizes that the 'ether' Fresnel spoke of consists of photons themselves.

Consider the following sound analogy. If a theoretical hairdryer that didn't emit any sound from its motor is activated and pointed at a sound receptor, very little actual sound will be detected with the exception of the brief moment that the audio receptor detects the first moving particle. Of course, it is assumed that the theoretical hairdryer operates in an atmosphere. And strictly speaking, a very slight level of sound will be detected as individual particles contact the receptor; but the point of the analogy is that this is not how sound is generally created. A loudspeaker, or source, does not spray a continuous stream of solid particles. It moves the particles it is directly in contact with, and those particles in turn move other particles. If particles are vibrated by the source, they will cause a wave that will propagate through gasses, liquids, and solids, collectively referred to as 'conventional matter'. And it is these vibrating particles of conventional matter at a distance from the source that are detected by a receptor and interpreted as sound.

Analogously, light is not a constant spray of photons but a repeating wave in an 'atmosphere' of photons. The sensors in our eyes, and in other photosensitive receptors, react to these waves of the photon atmosphere.

Light is a wave and a particle. Just like sound. It doesn't need to be one or the other. And it shouldn't be surprising that it has characteristics of both.

Light shouldn't be characterized as luminous particles for the same reason that sound shouldn't be characterized as sound particles. Light is the result of vibrating photons just as sound is the result of vibrations of particles at frequencies that our ears can detect and our minds can process. A motionless photon does not emit light.

Light is not brightness. Brightness and darkness are constructs. Light is perception.

Our minds create light and color from the vibrating photon atmosphere analogous to the way our minds create sound and pitch from vibrating particles. Just as different types of animals can hear different frequencies of sound, they can also see different frequencies of light.

Like a microphone picks up vibrations of particles of matter, photoreceptive elements pick up vibrations in the photon atmosphere.

Just as sound waves can interfere with each other, it has been previously observed that light waves can also interfere. This was illustrated in the double slit experiment performed by Thomas Young in 1803. However, this experiment has never fit with the current 'light as a particle' theory because emitted particles should not cause interference patterns. However, if light is understood as photon particles existing in all of space not occupied by conventional matter and becoming luminous when agitated, it can be visualized that waves in the photon atmosphere traveling from a source through a double slit will result in an interference pattern.

This proposed light theory reconciles the inconsistencies in the current 'light as a particle/ wave' theory.

This proposed theory also makes sense of the observation of 'single particle interference' where, in the double-slit experiment discussed above, it has been observed that single photons sent through a double slit will create the same interference pattern as a continuous stream of light.

Regarding single particle interference; what is currently thought of as a single photon emission is in fact such a gentle 'push' in the photon field that only one single photon particle is nudged enough at the destination to register as a photon coming into contact with the photoreceptor at a chosen location beyond the double slit. The location of the photon that contacts the photoreceptor will be predictable based on the probability of the interference pattern because, even though it is one individual particle contacting the medium, it is always part of a larger pool of photon particles.

As has been accepted as scientific fact, light is the product of changes in energy states of electrons in atoms. The photon atmosphere theory proposes that rather than a particle of light being created and moving in a particular direction, what is actually created is a wave in the photon atmosphere. As discussed above, when one photon is detected from a single electron energy state change, the photon detected is the photon nearest the detector that is 'nudged' from the other photons between the detector and the point of light wave emission.

This theory of photon behavior also answers the question of why light travels slower through denser materials. It would first seem that this is converse to the behavior of sound waves. The denser the particle concentration, the faster the sound wave.

However, the relationship is not converse.

Conventional matter is not part of the 'photon atmosphere'. It is proposed that conventional matter displaces photons in the photon atmosphere. Therefore, the denser the amount of conventional matter, the more spread out the photons in the photon atmosphere are. Each photon needs to travel further to contact the next photon. The further a photon needs to travel to contact another photon, the slower the light wave.

This theory of light also allows that photons in the photon atmosphere do not necessarily need to travel at the speed of light. It's the wave that travels at the speed of light.

Revisiting the sound analogy; sound travels at a fixed speed, but the particles that make up sound don't travel the full distance of the sound. The particles move back and forth at a frequency based on the pitch of the sound.

The particles that make up a sound wave do not necessarily need to be moving at the speed of sound. The wave itself moves at the speed of sound. The actual particles within the wave can move slower.

Light does not need to be independently considered a particle or wave. Light consists of particles that make up waves. The wave motion of the photon atmosphere creates the perception of light in a manner similar to the perception of sound created by wave patterns in conventional particles of matter.

This new theory reconciles the inconsistencies and contradictions of the current light particle/wave theory. New equations are not presented in this paper because the existing light wave equations remain valid and support this theory. This proposed theory requires a new understanding of the properties of particles within light waves. The particles are the wave.